



TETRA TECH

June 25, 2014

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**Subject: Final Preliminary Assessment Report
TVA Homer L Owens Substation Capacitors
EPA Identification No. KY8890090006
EPA Contract No. EP-W-05-054
Technical Direction Document (TDD) No. TTEMI-05-003-0173**

Dear Ms. Seadler:

The Tetra Tech Superfund Technical Assessment and Response Team (START) is submitting the final preliminary assessment (PA) report for the Tennessee Valley Authority (TVA) Homer L Owens Substation Capacitors located in Russellville, Logan County, Kentucky. Also included with this submittal are supporting reference materials.

Please contact me, Sherry Weedman, at (502) 569-9067 or Sandra Harrigan at (678) 775-3088 if you have any questions or comments regarding this submittal.

Sincerely,

Sherry Weedman
START III Site Manager

Andrew F. Johnson
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Enclosure

cc: Katrina Jones, EPA Project Officer
Angel Reed, START III Document Control Coordinator

FINAL
PRELIMINARY ASSESSMENT REPORT

TVA HOMER L OWENS SUBSTATION CAPACITORS
RUSSELLVILLE, LOGAN COUNTY, KENTUCKY

U.S. EPA ID NO. KY8890090006

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 4
Atlanta, Georgia 30303



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TDD No.	:	TTEMI-05-003-0173
Date Prepared	:	June 25, 2014
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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA), under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), tasked the Tetra Tech Superfund Technical Assessment and Response Team (START) with conducting a preliminary assessment (PA) of the Tennessee Valley Authority (TVA) Homer L Owens Substation Capacitors (the TVA substation) in Russellville, Logan County, Kentucky (EPA Identification Number [No.] KY8890090006). The PA was completed under Contract No. EP-W-05-054, Technical Direction Document (TDD) No. TTEMI-05-003-0173.

The purposes of a PA are to review existing information about a site and its environs to assess the threats, if any, posed to public health, welfare, or the environment, and to determine if further investigation under CERCLA/SARA is warranted. The scope of the PA includes reviewing information available from federal, state, and local agencies and conducting an on-site reconnaissance of the property and surrounding areas. Using these sources of existing information, the site is then evaluated using the EPA Hazard Ranking System (HRS) criteria to assess the relative threat associated with actual or potential releases of hazardous substances at the site. The HRS has been adopted by EPA to help set priorities for further evaluation and eventual remedial action at hazardous waste sites. The HRS is the primary method of determining a site's eligibility for placement on the National Priorities List (NPL). The NPL identifies sites where EPA may conduct remedial response actions. This report summarizes the findings of PA activities for the TVA substation in Russellville, Kentucky.

The PA report was written using guidance from EPA publications *Guidance for Performing Preliminary Assessments under CERCLA* (EPA 1991), *Guidance for Performing Site Inspections under CERCLA* (EPA 1992), and "Hazardous Ranking System Final Rule" (EPA 1990).

The remainder of this PA report is organized as follows:

- Section 2.0 discusses the site background, including the site location and description; operational and regulatory history; previous investigations; and source areas and waste characteristics.
- Section 3.0 describes the ground water migration, surface water migration, soil exposure, and air migration pathways.
- Section 4.0 summarizes and provides conclusions for PA activities.
- Section 5.0 lists references used to support the PA report.

Figures are provided in Appendix A. A photographic log is provided in Appendix B. The CERCLA Eligibility Form is provided in Appendix C. The preliminary HRS score and HRS Quickscore Score Sheets are in Appendix D.

2.0 SITE BACKGROUND

This section discusses the site background, including the site location and description, operational and regulatory history, previous investigations, and source areas and waste characteristics.

2.1 SITE LOCATION AND DESCRIPTION

The site is an approximate 1,475-square-foot parcel located along Cornelius Avenue in Russellville, Logan County, Kentucky (see Figures 1 and 2 in Appendix A). More specifically, the geographic coordinates for the TVA substation property, as measured from the entrance on Cornelius Avenue, are 36.848299 degrees north latitude and 86.891126 degrees west longitude. The parcel identification number from the Logan County geographic information system is "068-01-04-031-00" (Reference [Ref.] 1). The TVA substation property is bordered to the north by commercial properties, to the east by commercial and industrial properties, to the south by Cornelius Avenue with commercial properties beyond, and to the west by residential properties with commercial properties. Town Branch transects the eastern portion of the TVA substation property (see Figure 2 in Appendix A).

The TVA substation property consists of an approximate 1.4 acre area of electrical substation structures, a raised monitoring well located in the southern portion of the property, and a raised monitoring well in the northwestern portion of the property (see Figure 2 in Appendix A). The area of Town Branch that transects the eastern portion of the property contains riprap, asphalt, an outlet pipe from a storm water drain located adjacent to the substation structures, and a pipeline of unknown origin leading from the west bank to the east bank of Town Branch (see photographs 7, 8, and 9 in Appendix B).

Town Branch is a small creek that runs north through the city of Russellville and is located to the south and east of the former Rockwell Automation, Inc. (Rockwell) facility. The former Rockwell facility is located approximately 0.25 mile west of the TVA substation property (Ref. 2, p. 8; see Figure 1 in Appendix A). The East Ditch and the North Ditch located at the former Rockwell facility discharge into Town Branch (Refs. 2, p. 8; 3, p. 4). During the Tetra Tech site reconnaissance, flowing water was visible in Town Branch (see photograph 9 in Appendix B).

2.2 OPERATIONAL AND REGULATORY HISTORY

The site was first discovered in the mid-1980s when contamination from the former Rockwell die-cast facility, located about 0.25 mile west of and upstream from the TVA substation property along Town Branch, was discovered in Town Branch (Refs. 2, p.8; 3, pp. 120, 122).

The former Rockwell die-cast facility is located on a 44-acre parcel of land on Highway 68 West in Russellville. The former Rockwell facility is located in an area of Russellville that consists of commercial and industrial uses. Stormwater runoff from the former Rockwell facility that contains polychlorinated biphenyls (PCBs) is collected and treated at Rockwell's water treatment facility before it is discharged to the North Ditch under a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The North Ditch eventually discharges to Town Branch downstream of Route 431, which is also downstream of the TVA substation (Ref. 3, p.3). The East Ditch from the former Rockwell facility discharges into Town Branch upstream of Cornelius Avenue, which is just upstream of the TVA substation (Ref. 2, p. 8).

Rockwell operated an aluminum die-cast facility from 1957 until 1989. In 1989, Rockwell sold the facility to BTR Precision Die Casting. From 1957 to 1975, PCB-containing hydraulic fluid was used in the aluminum die-cast machines and was the main source of PCBs at the die-cast facility. In 1975, Rockwell discontinued the use of the PCB-containing hydraulic fluid and began using a non-PCB glycol-based hydraulic fluid. The die-cast facility is currently operated by Sensus, and the property is owned by the Logan County Economic Development Corporation. Rockwell retained responsibility for investigation and remediation of environmental impacts related to the historical PCB use at the facility. As such, Rockwell has undertaken investigation and remediation activities to address PCBs in environmental media (Ref. 3, pp. 4, 5). Remediation activities are ongoing under the purview of the Kentucky Department of Environmental Protection (KDEP) (Ref. 3, pp. 1, 2). Rockwell is not the focus of this PA.

2.3 PREVIOUS INVESTIGATIONS

In 1985, KDEP conducted an initial investigation of Town Branch and Mud River to assess the extent of PCBs from the former Rockwell facility operations. Surface water, sediment, and fish tissue samples were collected from Town Branch. Results indicated that sediment and fish samples contained PCBs

above background levels. Based on these results, Rockwell initiated investigations and cleanup activities, which were conducted from 1985 to 1997 under a series of Interim Agreed Orders (Ref. 3, pp. 5, 121).

Additional sampling was conducted from 1986 to 1988, which included collection of sediment, water, and biota samples from Town Branch. A PCB concentration of 6,600 milligrams per kilogram (mg/kg) was detected in a sediment sample collected from the west bank of Town Branch mid-way between Cornelius Avenue and Route 431, reportedly in the vicinity of the TVA substation. During sampling, an oily sheen was observed at this location. In 1987, an abandoned capacitor and other electrical rubbish were identified in Town Branch along the eastern boundary of the TVA substation (Ref. 3, pp. 121, 122).

In 1988, TVA removed rubble, debris, trees, shrubs, other vegetation, and associated soils along the streambank of Town Branch along the TVA substation (Refs. 4, pp. 1, 3, 4; 5, p. 1). TVA activities were completed before Rockwell cleanup activities reached this portion of the creek to ensure the rubble and debris were not released or discharged to Town Branch by Rockwell. Excavated portions of the streambank were backfilled and recontoured (Ref. 4, pp. 1, 6). After removal activities, TVA collected soil and sediment samples from various locations in Town Branch and within its property boundary along the western bank of Town Branch (Ref. 5, pp. 5, 6, 7). The soil and sediment samples contained PCBs at concentrations up to 670 mg/kg (Ref. 5, pp. 1, 3, 4). File material does not have any other information regarding TVA-lead investigations.

From 1989 to 2007, Rockwell performed remedial activities in Town Branch including areas from its property, which is upstream of the TVA substation, to areas downstream to the Mud River. The Rockwell investigations include areas along Town Branch along the TVA substation (Ref. 3). Below is a brief summary of the Rockwell investigation and activities.

Based on the results of the initial sampling events conducted from 1985 through 1988, Rockwell performed a remedial investigation (RI) in 1990 from the headwaters of Town Branch to the confluence of Town Branch with Mud River to further characterize and define the extent of PCBs. Results of the RI indicated that PCBs were identified in each of the sampled media (sediment, stream bank and floodplain soil, water column, spring water, and biota). Additional sampling was conducted by Rockwell in 1991 to supplement the 1990 data. Based on the sediment results, the most upstream point where PCBs were detected in Town Branch was approximately 1,000 feet upstream of the confluence of the East Ditch with Town Branch, which is located approximately between West 2nd Street and West 3rd Street, approximately 1,200 feet upstream of the TVA substation (Refs. 2, p. 8; 3, pp. 123 through 126).

Between 1992 and 1997, a series of pre-design investigations and remedial design activities were conducted to support the cleanup approach developed by Rockwell. A preliminary cleanup approach was developed for the removal of PCB-containing soils and sediments from approximately 1,200 feet upstream of the East Ditch confluence with Town Branch to an area adjacent to the Russell Wastewater Treatment Facility (WWTF). The Russellville WWTF is located approximately 2,500 feet downstream of the TVA substation. Sampling and monitoring conducted in 1994 and 1995 included sediment probing, sediment and soil sampling, water column monitoring, and biota sampling. Remedial design activities extended into 1997 (Ref. 3, pp. 120, 126).

From June 1997 through February 2001, Town Branch was cleaned up by Rockwell in three phases and included removal and off-site disposal of targeted PCB-containing soils and sediments along Town Branch, as well as cleanup in the North and East Ditches. From March 2001 through March 2003, routine water column sampling was performed at Town Branch on a biweekly basis to monitor PCB concentrations and assess trends (Ref. 3, pp. 120, 121, 130, 143).

Throughout 2002 and 2003, Rockwell performed various investigations and monitoring to further assess the PCB detections in Town Branch. In 2003, Rockwell collected resident fish and co-located sediment and water column samples from five locations in Town Branch. Data from the 2002 and 2003 studies indicated the presence of a residual source of PCBs in the West 3rd Street to West 2nd Street reach of Town Branch, approximately 1,200 feet upstream of the TVA substation, with water column data indicating a potential secondary source downstream. Sediment samples indicated that the sediment that had re-accumulated in Town Branch because previous cleanup activities still contained PCBs. Subsurface soils collected from soil borings near the West 3rd Street Bridge contained high PCB concentrations near the bedrock interface. PCBs were also detected in the groundwater collected from temporary piezometers installed in the soil borings (Ref. 3, pp. 121, 144, 145).

In 2004, Rockwell performed a bypass study to investigate the apparent PCB sources in the West 3rd Street to Cornelius Avenue reach of Town Branch, which is upstream of the TVA substation. The results of the study revealed that PCB-containing oil was discharging to Town Branch from the bedrock bedding planes in the creek bottom in two separate areas within the West 3rd Street to Cornelius Avenue reach. The study also revealed that groundwater containing PCBs discharges to the creek along the length of West 3rd Street to Cornelius Avenue reach and may also discharge to the creek in the Cornelius Avenue to Route 431 reach. Based on these results, Rockwell developed and evaluated alternatives to isolate these

portions of Town Branch. The alternative selected included construction of underdrain collection and liner systems (Refs. 2, p. 18; 3, pp. 121, 145).

In 2005, Rockwell performed an additional Town Branch Bypass Study to visually characterize the bedrock conditions in a portion of Town Branch from Cornelius Avenue to Route 431 to determine the presence of groundwater contamination. The investigation revealed no discharge of oil within this reach of Town Branch. From 2006 to 2007, Rockwell completed water column, sediment, and biota monitoring and sampling at Town Branch (Refs. 2, p. 18; 3, pp. 121, 153, 154, 155).

The 2007 Rockwell risk assessment revealed carcinogenic risks for agricultural scenarios in some areas and carcinogenic and noncarcinogenic risks for the fish consumption scenario (Ref. 3, pp. ES-8, 183, 184).

2.4 SITE RECONNAISSANCE

On December 20, 2013, Tetra Tech conducted a site reconnaissance in the vicinity of the TVA substation. Town Branch appeared to have undergone remedial activities, as riprap was observed along both the west and east banks (see photograph 7 in Appendix B). An outlet pipe from a storm water drain located adjacent to the substation structures was observed on the west bank of Town Branch located in the eastern portion of the TVA property. Water was not observed discharging from the outlet pipe at the time of the site reconnaissance. A pipeline of unknown origin suspended above the water was leading from the west bank to the east bank of Town Branch. Two monitoring wells were observed on the TVA substation property. No obvious signs of soil staining, discoloration, or odors were observed at the TVA substation or in Town Branch during the site reconnaissance. No fish were observed in Town Branch in the vicinity of the TVA substation. (Ref. 6; see Figure 2 in Appendix A).

2.5 SOURCE AREA AND WASTE CHARACTERISTICS

One potential source area has been identified at the site: contaminated soil located along approximately 3,000 square feet (300 feet long by about 10 feet wide) of the western bank of Town Branch in the eastern portion of the TVA substation. Soil still might be contaminated with PCBs that reportedly resulted from historical die-cast operations and associated releases at the former Rockwell facility and from disposal practices at the TVA substation property. As mentioned in Section 2.3, Previous Investigations, numerous assessment and remedial activities have been conducted in Town Branch adjacent to the TVA

substation. These activities have included excavation of contaminated soil along the banks of Town Branch adjacent to the TVA substation (Refs. 2, p. 18; 3, pp. 120 through 126, 130, 143 through 145, 153 through 155). At this time, it is not known whether contaminated soil still remains in this area.

3.0 PATHWAYS

This section discusses the ground water migration, surface water migration, soil exposure, and air migration pathways. Additionally, this section discusses the targets associated with each pathway and draws pathway-specific conclusions.

3.1 GROUND WATER MIGRATION PATHWAY

Russellville is located at the northern edge of the Mississippian Plateau Physiographic Region. This region consists of a limestone plain characterized by karst terrain. The karst terrain occurs because the bedrock is dominated by thick deposits of Mississippian-age limestones from the Chesterian Series. These limestones are soluble under the right conditions and can be eroded by waters moving through the ground. The TVA substation is located in the lower part of the Rocks of Chesterian unit from the Upper Mississippian age, which is primarily composed of limestone with some sandstone (Refs. 3, p. 85; 7).

Two aquifers are located beneath in the Russellville area, a shallow unconfined aquifer and a deep semi-confined or bedrock aquifer. The two aquifers are separated by a leaky confining layer that is composed of chert (Ref. 3, p. 58). Depth to groundwater in the shallow aquifer in the vicinity of Town Branch can occur as shallow as 3 feet below ground surface (bgs) (Ref. 3, p. 88). Groundwater underlying the TVA substation is expected to flow towards Town Branch to the east. Because the area is characterized by karst features, groundwater movement in the underlying aquifers varies. However, regional groundwater in the Russellville area generally flows to the north (Ref. 3, pp. 88, 89).

Soils at the TVA substation typically consist of silt loam, with Elk silt loam the most predominant. These soils are characterized as well drained with 2 to 6 percent slopes (Ref. 8).

The City of Russellville has an ordinance in place that restricts use of groundwater from private wells for drinking water (Ref. 9). However, the Kentucky Geological Survey, which maintains a database of water wells and springs, has identified 43 domestic household, 22 agricultural, and 2 commercial irrigation wells within the 4-mile radius of the TVA substation (Refs. 18; 19). According to the U.S. Census

Bureau, about 2.42 persons occupy a household in Logan County (Ref. 20). Therefore, about 104 persons (43×2.42) use domestic water wells (Refs. 19; 20) (see Figure 3 in Appendix A).

3.2 SURFACE WATER MIGRATION PATHWAY

The water depth in Town Branch is typically less than 3 feet, and the width of the creek ranges from 20 to 25 feet. Heavy rains and flooding are common in Russellville, with minor flooding occurring on an annual basis. Heavy rains cause the water level in Town Branch to rise rapidly to levels of 4 to 5 feet above the stream bed for short periods of time (Ref. 3, p. 4).

The 2-year, 24-hour rainfall event for the area is 3 inches (Ref. 10). The normal annual total precipitation for the area is about 46 inches, and the mean annual evaporation is about 36 inches, yielding a net annual precipitation of about 10 inches (Ref. 11).

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) depicting the TVA substation property, Panel No. 21141C0257D, the property is located in Zone AE (shaded): "Areas determined with a 1% annual chance of flooding" (Ref. 12).

Based on the topography, surface water runoff from the TVA substation drains to the east into Town Branch. Town Branch flows north for about 3.5 miles into the Mud River (see Figure 2 and 3 in Appendix A). The East Ditch from the former Rockwell facility empties into Town Branch at the railroad tracks south of Cornelius Avenue, about 200 feet upstream of the TVA substation (Ref. 2, p. 8, Figure 4-1). From the confluence with Town Branch, the Mud River flows north for more than 11.5 miles to the Green River (Ref. 3, p. 4). Town Branch and Mud River comprise the 15-mile surface water migration pathway target distance limit (TDL) (see Figure 4 in Appendix A). The probable point of entry for surface water runoff from the TVA substation into perennial surface water is along the property's entire eastern border with the west bank of Town Branch (see Figures 2 and 4 in Appendix A). This location is just north of the Cornelius Avenue Bridge and downstream of the East Ditch from the former Rockwell facility (Ref. 2, p. 8, Figure 4-1).

Drinking water in the Russellville area is obtained from surface water intakes on the Cumberland River. Approximately 8,613 people are served by the City of Russellville Water Department, which serves 75

percent of Russellville and surrounding cities to the west and north (Ref. 9). The Cumberland River is located outside the Town Branch watershed (see Figure 4 in Appendix A).

A fish consumption advisory was issued in 1999 for Town Branch because of the presence of PCBs (Ref. 13). Kentucky Department of Fish and Wildlife Resources (KDFWR) personnel confirmed that fishing does not occur in Town Branch or the Mud River (Ref. 21). During the December 2013 site reconnaissance, no fish were observed in Town Branch in the vicinity of the TVA substation (Ref. 6).

The federally endangered Littlewing pearlymussel (*Pegias fabula*) and Slabside pearlymussel (*Pleuroaia dolabelloides*) inhabit Logan County, Kentucky; however, specific habitat locations are not known (Ref. 14). No wetlands are located along the 15-mile surface water migration pathway TDL (Ref. 15) (see Figure 4 in Appendix A).

3.3 SOIL EXPOSURE PATHWAY AND AIR MIGRATION PATHWAYS

Land use in the vicinity of the TVA substation is a mixture of residential and commercial (see Figures 1 and 2 in Appendix A). The TVA substation property is bordered to the north by commercial properties, to the east by commercial and industrial properties, to the south by Cornelius Avenue with commercial properties beyond, and to the west by residential properties with commercial properties beyond. Town Branch is located in the eastern portion of the TVA substation (see Figure 2 in Appendix A). The topography of the property is generally flat with sloping along the east toward Town Branch. The perimeter of the substation structures is fenced. Access to Town Branch is unrestricted.

The nearest residents are located about 330 feet west of the TVA substation (see Figure 2 in Appendix A). The nearest school is about 0.48 mile to the southeast (Ref. 16). About 3,976 people live within 1 radial mile, and about 9,991 people live within 4 radial miles of the TVA substation. Based on the U.S. Bureau of the Census 2010 population data, the residential population within a 4-mile radius is distributed as follows: >0 to 0.25 mile, 248 persons; >0.25 to 0.50 mile, 669 persons; >0.50 to 1.0 mile, 3,059 persons; >1.0 to 2.0 miles, 3,101 persons; >2.0 to 3.0 miles, 1,555 persons; >3.0 to 4.0 miles, 1,359 persons (Ref. 17) (see Figure 3 in Appendix A).

The federally endangered Indiana bat (*Myotis sodalists*) and Gray bat (*Myotis grisescens*) inhabit Logan County, Kentucky; however, specific habitat locations are not known (Ref. 14). Wetlands are located within a 4-mile radius of the TVA substation, but the exact acreage is not known (Ref. 15).

4.0 SUMMARY AND CONCLUSIONS

The site is an approximate 1,475-square-foot parcel located along Cornelius Avenue in Russellville, Logan County, Kentucky. The area of Town Branch that transects the eastern portion of the TVA substation property contains riprap, asphalt, an outlet pipe from a storm water drain located adjacent to the substation structures, and a pipeline of unknown origin leading from the west bank to the east bank of Town Branch.

One possible source area may be located at the TVA substation: about 3,000 square feet of contaminated soil is located along the western bank of Town Branch in the eastern portion of the property. Soils may still be contaminated with PCBs possibly from past disposal activities at the TVA substation and historical die-cast operations and associated releases at the former Rockwell facility.

The City of Russellville has an ordinance in place that restricts use of groundwater from private wells for drinking water; however, the KGS database indicates that 43 domestic wells that serve about 104 people are located within the 4-mile radius of the TVA substation. No surface water intakes are located within the 15-mile TDL. Surface water is piped from the Cumberland River, which is located outside the Town Branch watershed.

A fish consumption advisory was issued in 1999 for Town Branch because of the presence of PCBs. KDFWR personnel confirmed that fishing does not occur in Town Branch or the Mud River. During the December 2013 site reconnaissance, no fish were observed in Town Branch in the vicinity of the TVA substation.

Based on the review of historical documentation, analytical data, and pathway targets, the site presents a minimal threat to human health and the environment. The surface water migration pathway is of primary concern, and the portions of the TDL, including areas of Town Branch at and downstream of TVA substation and the Mud River are being addressed by Rockwell under the purview of KDEP.

5.0 REFERENCES

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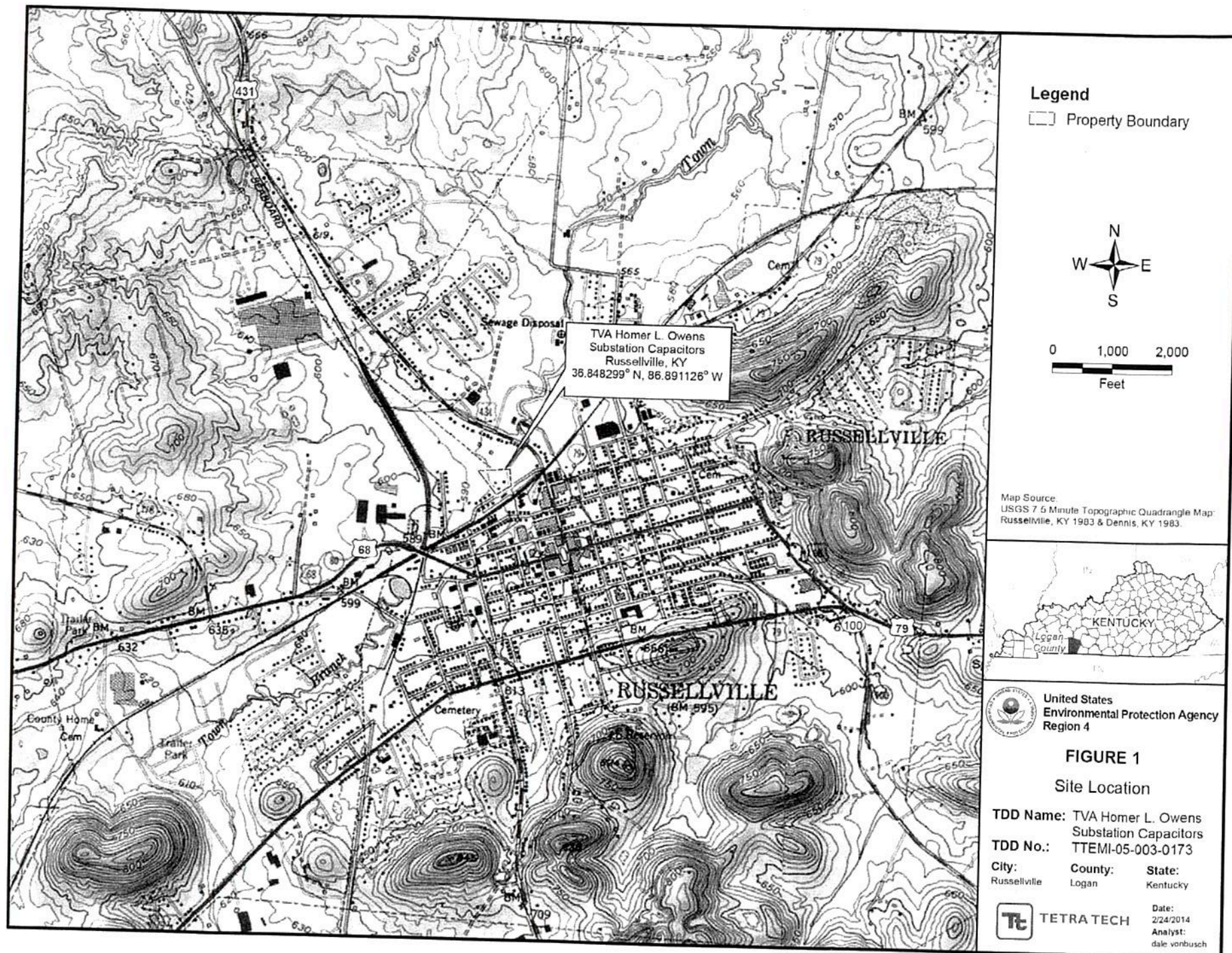
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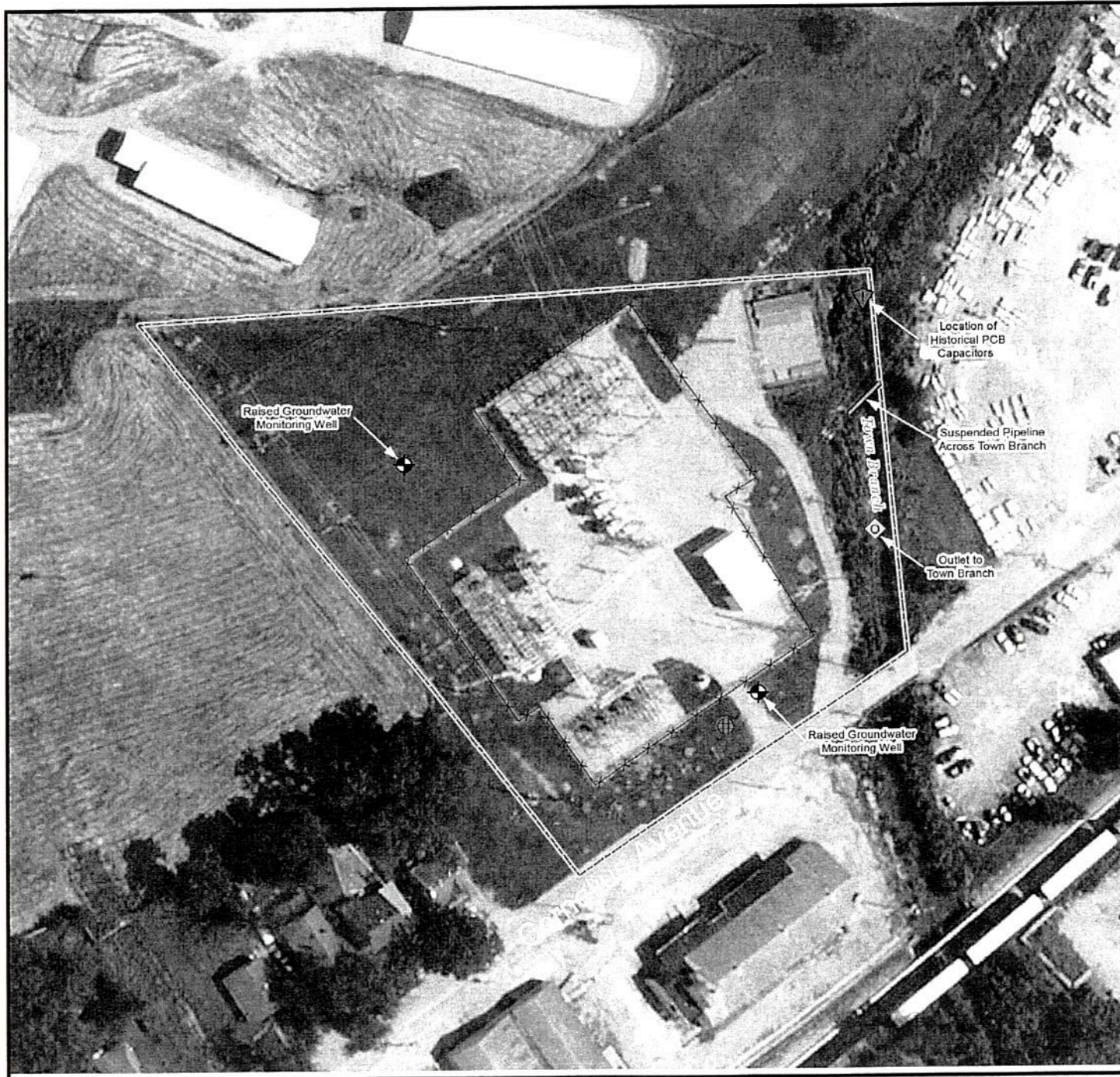
APPENDIX A

FIGURES

(4 Pages)

- 1 SITE LOCATION
- 2 SITE LAYOUT
- 3 4-MILE RADIUS MAP
- 4 15-MILE SURFACE WATER MIGRATION PATHWAY TDL





Legend

- Drain
- Monitoring Well
- PCB Capacitor Location
- Stormwater Outlet
- Fence
- Pipe
- Property Boundary



0 50 100
Feet

Map Source:
Aerial Imagery, ESRI 2011-2012



United States
Environmental Protection Agency
Region 4

FIGURE 2

Site Layout

TDD Name: TVA Homer L. Owns
Substation Capacitors
TDD No.: TTEMI-05-003-0173
City: Russellville **County:** Logan **State:** Kentucky



TETRA TECH

Date:
1/14/2014
Analyst:
dale vorbusch

Legend

- Domestic Well
- Property Boundary



Map Source:
Domestic wells obtained from Kentucky
Geological Survey, Groundwater Data
Repository
USGS 7.5 Minute Quadrangle Maps
Lewisburg, KY 1983 & Homer, KY 1982
& Russellville, KY 1983 & Dennis, KY 1983



United States
Environmental Protection Agency
Region 4

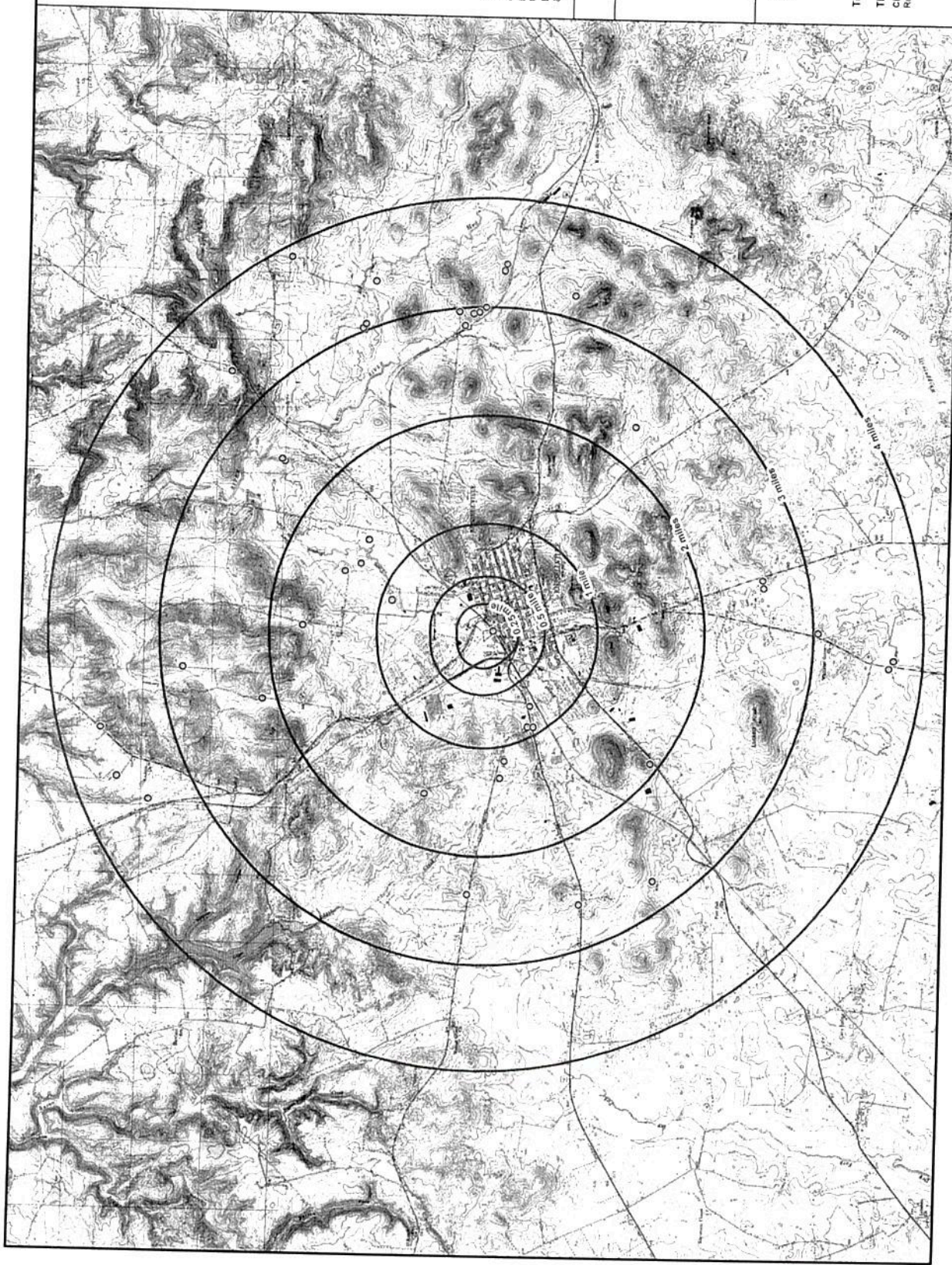
FIGURE 3

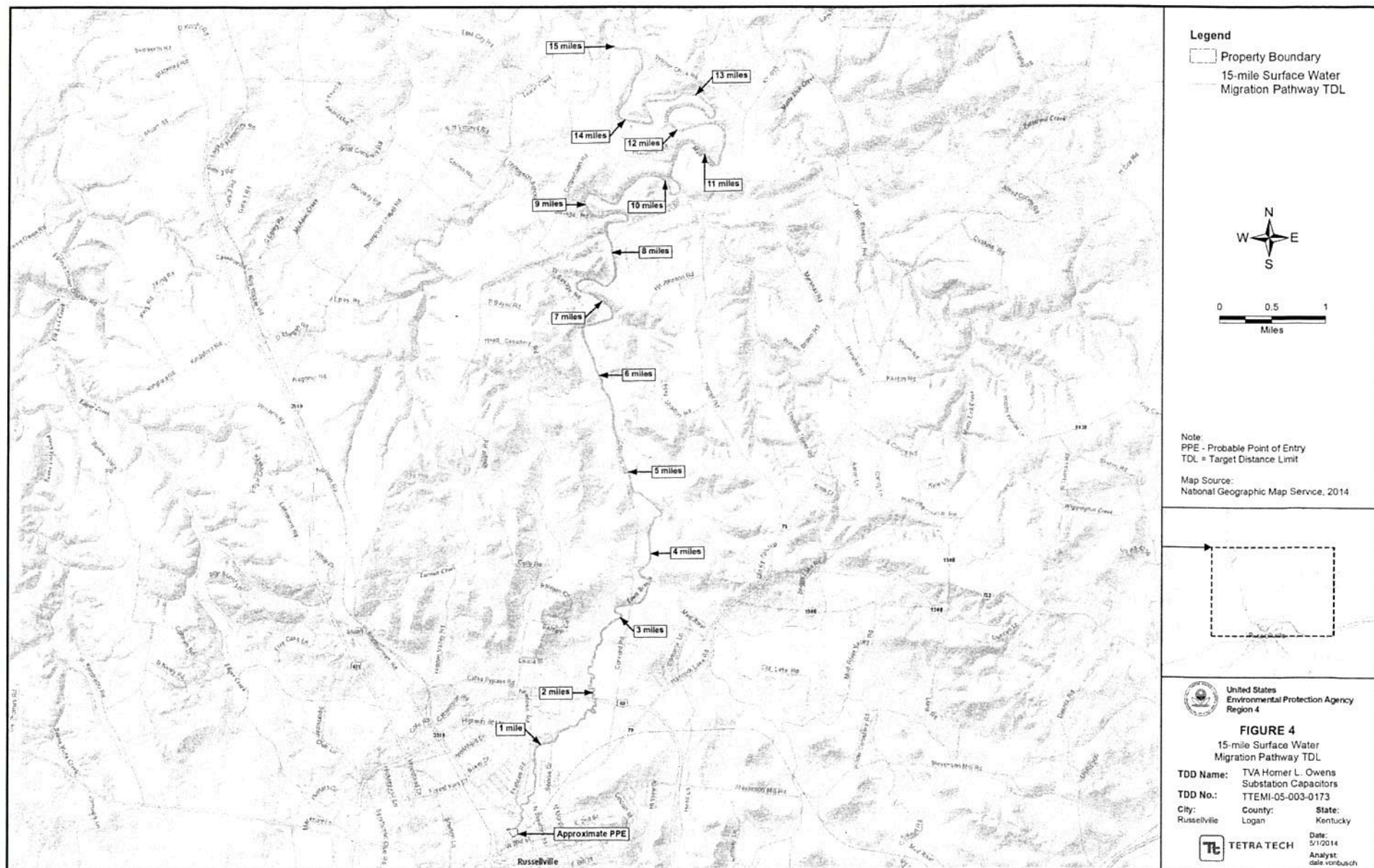
4-mile Radius

TDD Name: TVA Homer L. Owens
Substation Capacitors
TDD No.: TTEM-05-003-0173
City: Russellville
County: Logan
State: Kentucky
Date: 5/1/2014
Analyst: dale.vorbauch

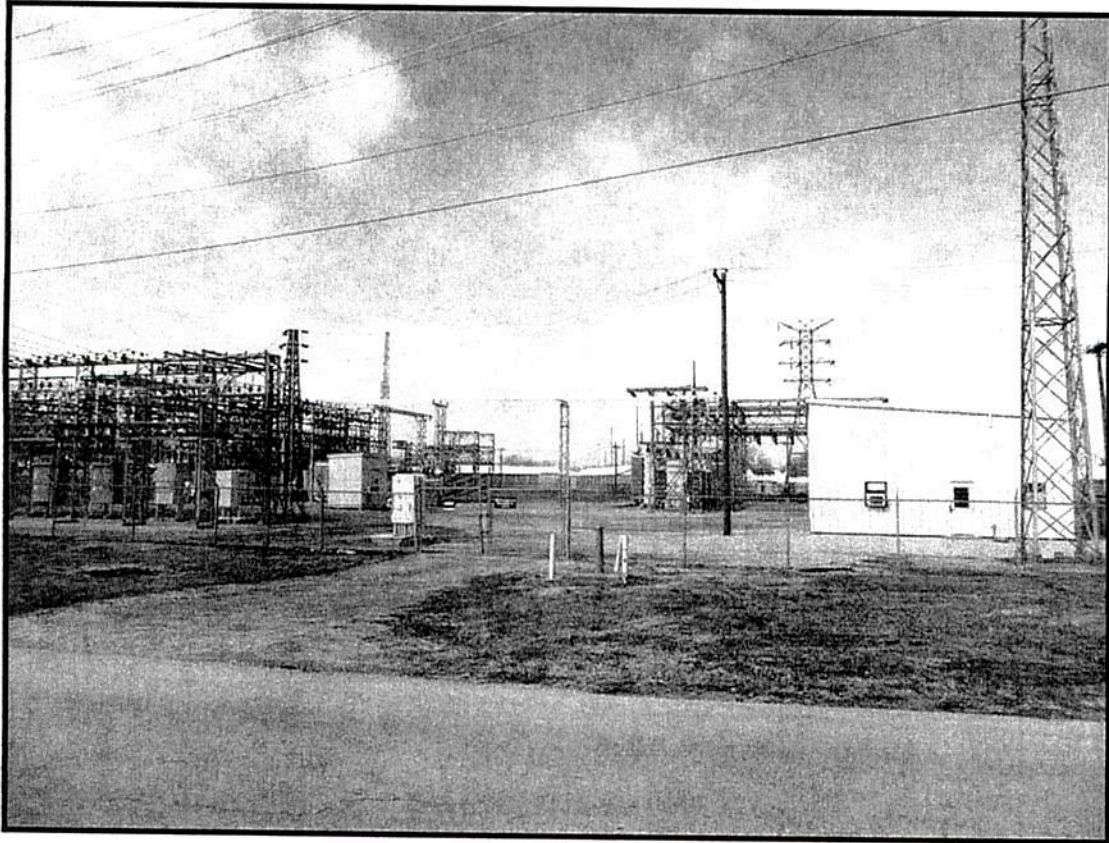


Fig. 1 TTEM-05-003-0173, TVA, N.C., Emergency Response Unit, New York, N.Y., 2011





APPENDIX B
PHOTOGRAPHIC LOG
(10 Pages)



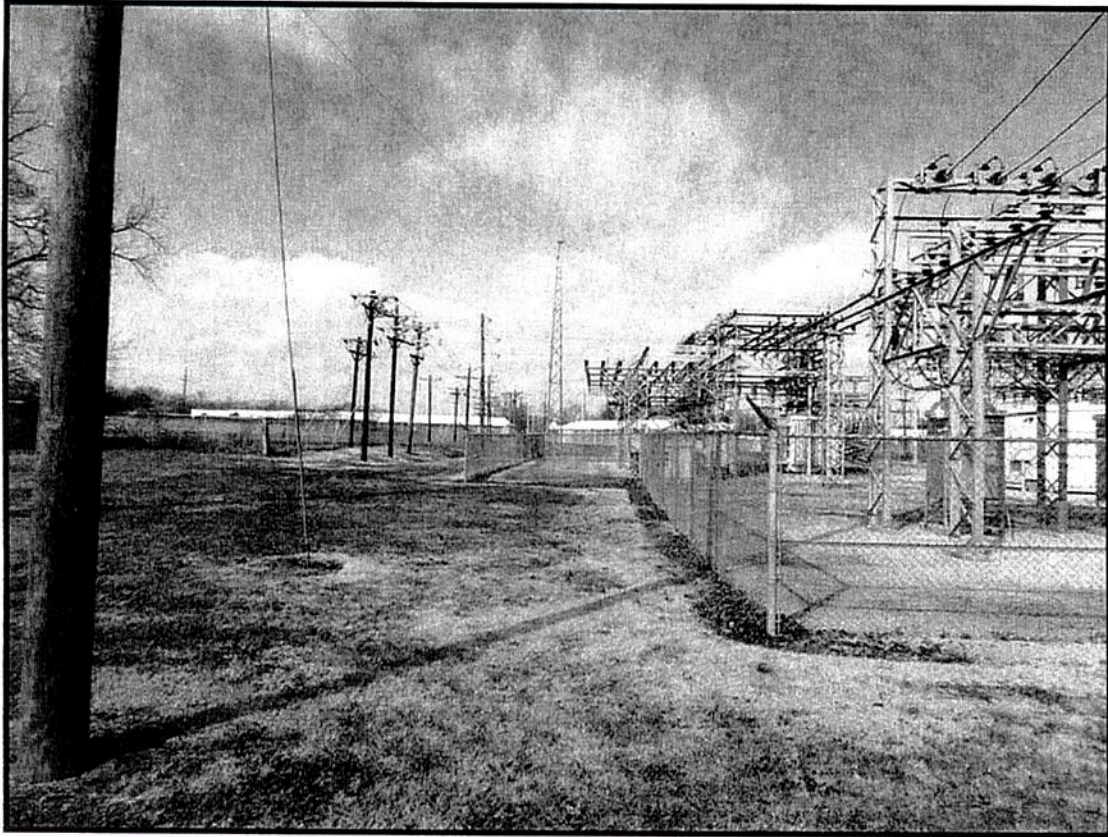
OFFICIAL PHOTOGRAPH NO. 1
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	Northwest	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of the front entrance and gate to the Tennessee Valley Authority (TVA) Homer L Owens Substation Capacitors (the TVA substation).		



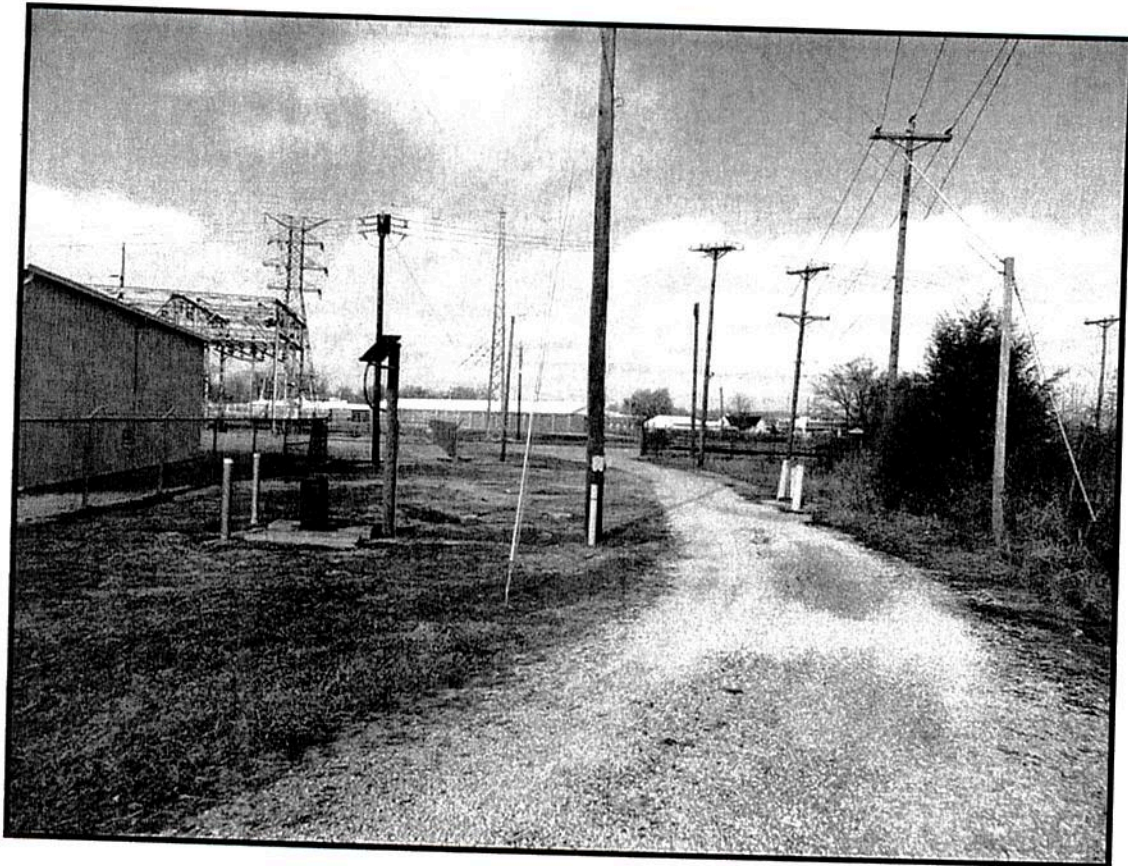
OFFICIAL PHOTOGRAPH NO. 2
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number: TTEMI-05-003-0173 Location: TVA Homer L Owens Substation
Capacitors
Orientation: Northwest Date: December 20, 2013
Photographer: Sherry Weedman, Tetra Tech Witness: None
Subject: View of the front entrance and sign to the TVA substation. A monitoring well is
visible in the foreground.



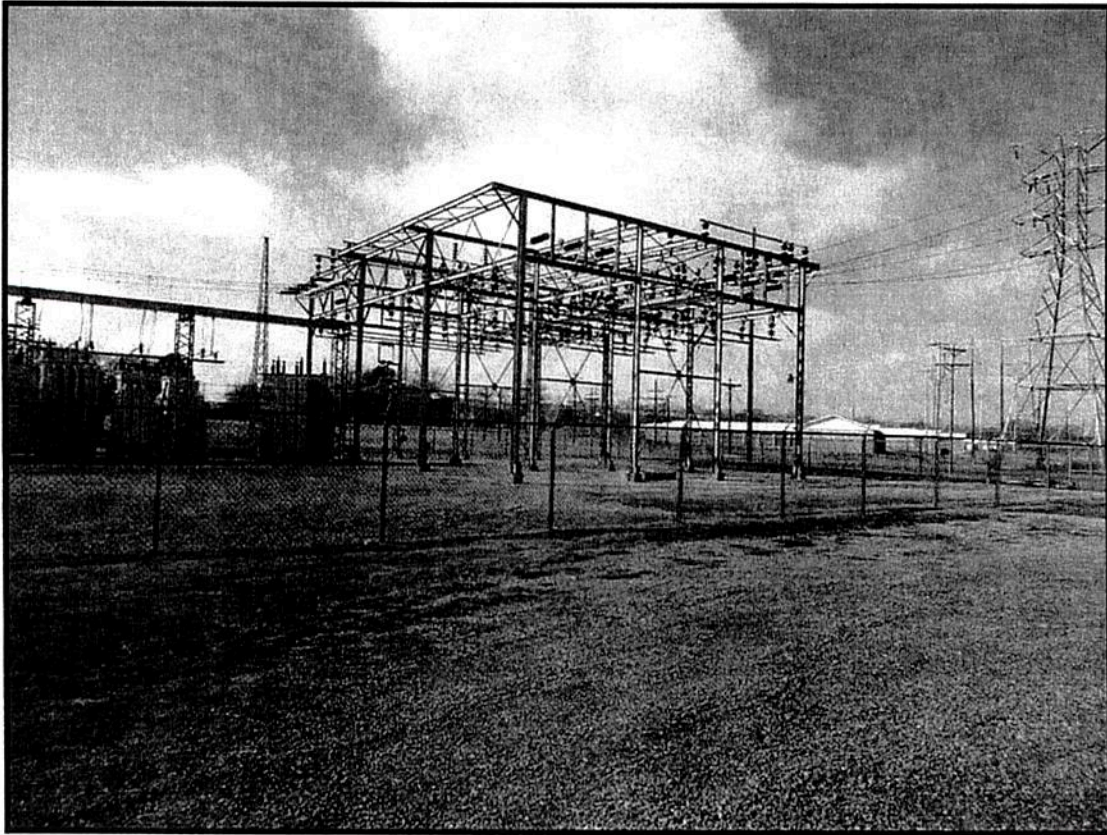
**OFFICIAL PHOTOGRAPH NO. 3
U.S. ENVIRONMENTAL PROTECTION AGENCY**

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	Northwest	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of the western portion of the TVA substation. The substation structures are fenced.		



OFFICIAL PHOTOGRAPH NO. 4
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	North	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of the eastern portion of the TVA substation. The substation structures are fenced.		



OFFICIAL PHOTOGRAPH NO. 5
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	Northwest	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of the northern portion of the TVA substation. The substation structures are fenced.		



OFFICIAL PHOTOGRAPH NO. 6
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number: TTEMI-05-003-0173 Location: TVA Homer L Owens Substation Capacitors

Orientation: South Date: December 20, 2013

Photographer: Sherry Weedman, Tetra Tech Witness: None

Subject: View of the northern portion of the TVA substation. The substation structures are fenced. A monitoring well is visible in the foreground. A low lying earthen area is also visible in the foreground. At the time of the site reconnaissance, the area contained approximately four inches of standing water and was approximately twenty feet in length.



OFFICIAL PHOTOGRAPH NO. 7
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	North	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of the west bank of Town Branch, located along the eastern property boundary of the TVA substation. Riprap is visible along the west bank.		



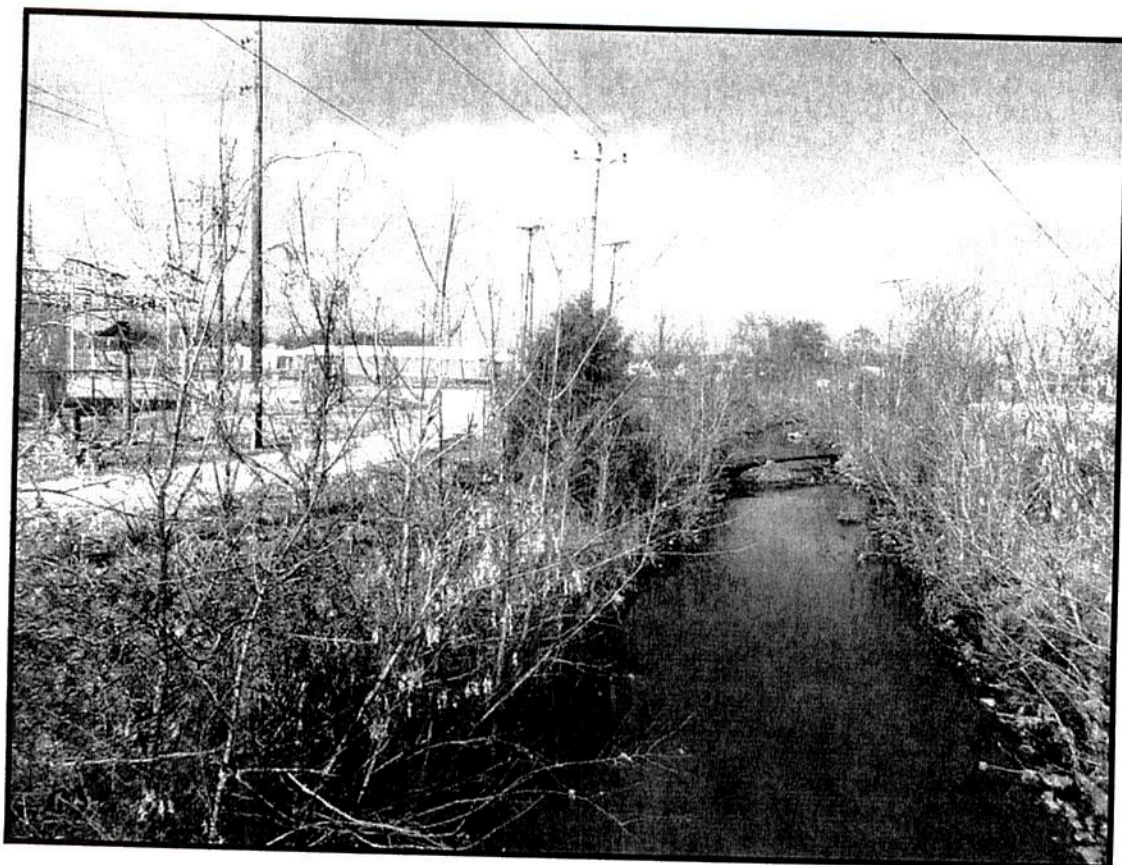
OFFICIAL PHOTOGRAPH NO. 8
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	East	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of an outlet pipe from a storm water drain located adjacent to the TVA substation structures on the west bank of Town Branch.		



OFFICIAL PHOTOGRAPH NO. 9
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	Southeast	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of a pipeline of unknown origin leading from the west bank to the east bank of Town Branch.		



OFFICIAL PHOTOGRAPH NO. 10
U.S. ENVIRONMENTAL PROTECTION AGENCY

TDD Number:	TTEMI-05-003-0173	Location:	TVA Homer L Owens Substation Capacitors
Orientation:	North	Date:	December 20, 2013
Photographer:	Sherry Weedman, Tetra Tech	Witness:	None
Subject:	View of Town Branch from the Cornelius Avenue Bridge located directly southeast and upstream of the TVA substation. The substation structures are visible to the left. The pipeline of unknown origin crossing Town Branch is visible in the background.		

APPENDIX C
CERCLA ELIGIBILITY FORM
(1 Sheet)

CERCLA ELIGIBILITY FORM

Site Name: TVA Homer L Owens Substation Capacitors

City County State: Russellville, Logan County, Kentucky

EPA ID Number: KY8890090006

I. CERCLA ELIGIBILITY

Yes No

Did the facility cease operations prior to November 19, 1980?

___ X

If answer YES, STOP, facility is probably a CERCLA site.

If answer NO, Continue to Part II.

II. RCRA ELIGIBILITY

Yes No

Did the facility file a RCRA Part A application?

___ X

If YES:

1. Does the facility currently have interim status?

___ ___

2. Did the facility withdraw its Part A application?

___ ___

3. Is the facility a known or possible protective filer?
(facility filed in error)

___ ___

4. Type of facility:

Generator ___ Transporter ___ Recycler ___

TSD (Treatment Storage Disposal) ___

Does the facility have a RCRA operating or post closure permit?

___ X

Is the facility a late (after 11 19 80) or non-filer that has been identified by the EPA or the State? (facility did not know it needed to file under RCRA)

___ X

If all answers to questions in Part II are NO, STOP, the facility is a CERCLA eligible site.

If answer to #2 or #3 is YES, STOP, the facility is a CERCLA eligible site.

If answer #2 and #3 are NO and any OTHER answer is YES, site is RCRA, continue to Part III.

III. RCRA SITES ELIGIBLE FOR NPL

Yes No

Has the facility owner filed for bankruptcy under federal or state laws?

___ ___

Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?

___ ___

Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980?

___ ___

APPENDIX D
PRELIMINARY HAZARD RANKING SYSTEM (HRS) SCORE
AND HRS QUICKSCORE™ SCORE SHEETS
(11 Pages)

CONFIDENTIAL

**PRELIMINARY HAZARD RANKING SYSTEM (HRS) SCORE
AND HRS QUICKSCORE™ SCORE SHEETS
FOR
TVA HOMER L OWENS SUBSTATION CAPACITORS
RUSSELLVILLE, LOGAN COUNTY, KENTUCKY
EPA ID No. KY8890090006**

The ground water, surface water, and air migration and the soil exposure pathways were evaluated using the Hazard Ranking System (HRS) Quickscore software. Using the available file information and targets, worst case scenarios are presented for all pathways.

PATHWAY SCORES

Pathway	Pathway Score
Ground Water Migration	3.84
Surface Water Migration	42.60
Soil Exposure	0.60
Air Migration	1.61
Overall Site Score	21.40

Sources and Waste Characteristics

The Tennessee Valley Authority (TVA) Homer L Owens Substation Capacitors site (TVA substation) is an approximate 1,475-square-foot parcel located along Cornelius Avenue in Russellville, Logan County, Kentucky. Town Branch transects the eastern portion of the TVA substation property. The area of Town Branch that transects the eastern portion of the property contains riprap, asphalt, an outlet pipe from a storm water drain located adjacent to the substation structures, and a pipeline of unknown origin leading from the west bank to the east bank of Town Branch.

The site was first discovered in the mid-1980s when contamination from the former Rockwell Automation, Inc. (Rockwell) die-cast facility, located about 0.25 mile west of and upstream from the TVA substation property along Town Branch, was discovered in Town Branch.

The former Rockwell die-cast facility is located on a 44-acre parcel on Highway 68 West in Russellville, Logan County, Kentucky. Rockwell operated an aluminum die-cast facility from 1957 until 1989. From 1957 to 1975, polychlorinated biphenyl (PCB)-containing hydraulic fluid was used in the aluminum die-cast machines and was the main source of PCBs at the die-cast facility.

One potential source area has been identified at the TVA substation: about 3,000 square feet (about 300 feet long by 10 feet wide) of contaminated soil is located along the western bank of Town Branch in the eastern portion of the TVA substation property. Soils may have become contaminated with PCBs from past disposal activities at the TVA substation and historical die-cast operations and associated releases from the former Rockwell facility located along Town Branch upstream of the TVA substation.

The site score is based on a hazardous waste quantity (HWQ) value of 10 for the ground water migration, surface water migration, soil exposure, and air migration pathways. The HWQ is based on an estimated 3,000 square feet (about 300 feet long by about 10 feet wide) of contaminated soil located along the western bank of Town Branch in the eastern portion of the TVA substation. Analytical results for sediment samples collected in 1985 from Town Branch contained PCBs above background levels.

Ground Water Migration Pathway

Groundwater underlying the TVA substation is expected to flow towards Town Branch to the east. Because the area is characterized by karst features, groundwater movement in the underlying aquifers varies. However, regional groundwater in the Russellville area generally flows to the north. The City of Russellville has an ordinance in place that restricts use of groundwater from private wells for drinking water. The Kentucky Geological Survey (KGS) database of wells and springs contains 43 domestic, 22 agricultural, and two commercial irrigation wells within a 4-mile radius of the TVA substation. Using the information in the KGS database, 104 people within the the 4-mile radius obtain drinking water from ground water wells and are distributed as follows: >0 to 0.25 mile, 2 people; >0.25 mile to 0.5 mile, 0 people; >0.5 to 1 mile, 10 people; >1 to 2 miles, 22 people; >2 to 3 miles, 36 people; >3 to 4 miles, 34 people.

The 2004 Rockwell bypass study revealed that groundwater containing PCBs discharges to the creek along the length of West 3rd Street to Cornelius Avenue reach and may also discharge to the creek in the Cornelius Avenue to Route 431 reach. Ground water monitoring wells are located on the TVA substation property; however, file information does not indicate who installed the wells and ground water analytical results were not available for the on-site monitoring wells.

The groundwater migration pathway was evaluated based on an observed release of PCBs to the karst shallow aquifer. The groundwater migration pathway score was calculated based on the following: likelihood of release factor value of 550 (observed release of PCBs); waste characteristics factor value of 18 (HWQ of 10 and toxicity/mobility factor value of 10,000); and targets value of 32 (nearest well of 20 [karst], distance-weighted potential contamination targets of 7, and resources of 5 [irrigation]). The groundwater migration pathway score is therefore calculated as follows:

$$(550 [\text{likelihood of release}] \times 18 [\text{waste characteristics}] \times 32 [\text{targets}]) \div 82,500 = 3.84$$

Surface Water Migration Pathway

Based on the topography, surface water runoff from the TVA substation drains to the east into Town Branch. Town Branch flows north for about 3.5 miles into the Mud River. As depicted in Figure 4-1 of Reference 2 of the PA report, the East Ditch from the former Rockwell facility empties into Town Branch at the railroad tracks south of Cornelius Avenue, about 200 feet upstream of the TVA substation. From the confluence with Town Branch, the Mud River flows north for more than 11.5 to the Green River. Town Branch and Mud River comprise the 15-mile surface water migration pathway target distance limit (TDL). Sediment samples collected from 1986 to 1988 in Town Branch reportedly in the vicinity of the TVA substation contained PCBs above background levels. A PCB concentration of 6,600 milligrams per kilogram (mg/kg) was detected in a sediment sample collected from the west bank of Town Branch mid-way between Cornelius Avenue and Route 431, which is located upstream of the TVA substation. The probable point of entry for runoff from the TVA substation into perennial surface water is along the property's eastern border with the west bank of Town Branch, which is about 25 feet downstream of Cornelius Avenue and about 225 feet downstream of the East Ditch from the former Rockwell facility.

Drinking water in the Russellville area is obtained from surface water intakes on the Cumberland River. Approximately 8,613 people are served by the City of Russellville Water Department, which serves 75 percent of Russellville and surrounding cities to the west and north. The Cumberland River is located outside the Town Branch watershed.

A fish consumption advisory was issued in 1999 for Town Branch because of the presence of PCBs. The Kentucky Department of Fish and Wildlife Resources (KDFWR) has confirmed that fishing does not occur in Town Branch or the Mudd River in the Russellville area. During the December 2013 site reconnaissance, no fish were observed in Town Branch in the vicinity of the TVA substation.

The federally endangered Littlewing pearlymussel (*Pegias fabula*) and Slabside pearlymussel (*Pleuroaia dolabelloides*) inhabit Logan County, Kentucky; however, specific habitat locations are not known. No wetlands are located along the 15-mile surface water migration pathway TDL.

The surface water migration pathway was evaluated based on an observed release of PCBs to perennial surface water with a fishery downstream. The targets evaluated for each threat is described below.

Drinking Water Threat – No surface water intakes for drinking water purposes are located along the 15-mile surface water migration pathway TDL. A resources value of 5 was assigned for irrigation (worst case scenario).

Human Food Chain Threat – Observed release to perennial surface water (Town Branch) with a fishery downstream (Mud River) was evaluated and assigned a value of 20. Potential contamination to a downstream fishery was evaluated in the event that attempts to catch fish for consumption occur in the Mud River, but is not documented.

Environmental Threat – Potential contamination of sensitive environments was evaluated. Two federal endangered species are present in Logan County, though the actual locations of habitats are not known. Therefore, a sensitive environment value of 150 was assigned. The flow rate for Town Branch was estimated at less than 10 cubic feet per second.

The surface water migration pathway score was calculated as follows:

- Drinking water threat: likelihood of release, 550; waste characteristics, 18 (toxicity/persistence factor value of 10,000 [PCBs], and HWQ of 10); and targets, 5 (resources). Therefore, $(550 \times 18 \times 5) \div 82,500 = 0.6$
- Human food chain threat: likelihood of release, 550; waste characteristics, 180 (toxicity/persistence/bioaccumulation factor value of $5E+8$ for PCBs and HWQ of 10); and targets, 20 (fishery downstream). Therefore, $(550 \times 180 \times 20) \div 82,500 = 24$
- Environmental threat: likelihood of release, 550; waste characteristics, 180 (toxicity/persistence/bioaccumulation factor value of $5E+8$ [PCBs] and HWQ of 10); and targets, 15 (potential to release, two federal endangered species). Therefore, $(550 \times 180 \times 15) \div 82,500 = 18$

The surface water migration pathway score is calculated by adding the three threat scores. The surface water migration pathway score is $0.6 + 24 + 18 = 42.6$

Soil Exposure Pathway

The TVA substation property is located in a mixed residential and commercial area. Town Branch is located along the eastern property boundary. The topography of the property is generally flat with sloping along the east toward Town Branch. TVA personnel maintain the property; therefore, workers are present for limited amounts of time. The perimeter of the substation structures is fenced. Access to Town Branch is unrestricted.

The nearest residents are located about 330 feet west of the TVA substation. The nearest school is about 0.48 mile to the southeast. About 3,976 people live within 1 radial mile of the TVA substation. Based on the U.S. Bureau of the Census 2010 population data, the residential population within 1 radial mile radius is distributed as follows: 0 to 0.25 mile, 248 persons; 0.25 to 0.50 mile, 669 persons; 0.50 to 1.0 mile, 3,059 persons.

Soil samples collected from the western bank of Town Branch along the eastern property boundary contained PCBs. Targets evaluated for the soil exposure pathway include workers (assumed about 5) at the TVA substation and nearby residents who may come in contact with contamination along the bank of Town Branch. No residences, schools or daycare centers are located on the suspected area of contaminated soil along the eastern property boundary.

The resident and nearby population threats of the soil exposure pathway were evaluated as follows:

- Resident population threat: likelihood of exposure, $550 \times$ waste characteristics, 18 (toxicity factor value of 10,000 [PCBs] and HWQ of 10) \times targets, 5 (assumed about 5 workers); therefore, $550 \times 18 \times 5 = 49,500$
- Nearby population threat: likelihood of exposure, 5 (attractiveness/accessibility, 50 and area of contamination, 5) \times waste characteristics, 18 (toxicity factor value of 10,000 [PCBs] and HWQ of 10) \times targets, 5 (nearest individual, 1 and distance-weighted population value, 4); therefore, $5 \times 18 \times 5 = 450$

The soil exposure pathway score is calculated by adding the two threat scores then dividing by 82,500. Therefore, the soil exposure pathway score is $49,500 + 450 \div 82,500 = 0.60$.

Air Migration Pathway

Land use in the vicinity of the TVA substation is a mixture of residential and commercial. The TVA substation property is bordered to the north by commercial properties, to the east by commercial and industrial properties, to the south by Cornelius Avenue with commercial properties beyond, and to the west by residential properties with commercial properties beyond. Based on the U.S. Bureau of the Census 2010 population data, about 9,991 people reside within a 4-mile radius of the TVA substation and are distributed as follows: >0 to 0.25 mile, 248 persons; >0.25 to 0.50 mile, 669 persons; >0.50 to 1 mile, 3,059 persons; >1 to 2 miles, 3,101 persons; >2 to 3 miles, 1,555 persons; >3 to 4 miles, 1,359 persons. The federally endangered Indiana bat (*Myotis sodalists*) and Gray bat (*Myotis grisescens*) inhabit Logan County, Kentucky; however, specific habitat locations are not known. Wetlands are located within a 4-mile radius of the TVA substation, but the exact acreage is not known.

The air migration pathway was evaluated as follows: likelihood of release factor value of 500 (potential to release of PCBs, default value); waste characteristics factor value of 6 (toxicity/mobility factor value of 200 and HWQ of 10); and targets value of 44.2745 (nearest individual value of 20, distance-weighted

potential population targets of 19, and potential sensitive environments value of 0.2745). The air migration pathway score is therefore calculated as follows:

$$(500 \text{ [likelihood of release]} \times 6 \text{ [waste characteristics]} \times 44.2745 \text{ [targets]}) \div 82,500 = 1.61$$

Data Gaps

During the PA, the following data gaps were identified.

- The available file information does not contain a report that summarizes the removal activities that TVA conducted along the west bank of Town Branch.
- It is not known whether debris removed by TVA along the west bank of Town Branch resulted in PCB contamination of the creek.
- It is not known whether TVA has conducted subsequent investigations (including soil, ground water, surface water, and sediment sampling) at the substation and Town Branch since the August 1988 sampling event. TVA has been contacted regarding these documents and possible activities. However, no additional information has been obtained.
- The Logan County geographic information system website depicts the TVA substation property boundary to include Town Branch. However, it is not known whether Town Branch is in fact part of the TVA property.
- It is not known to what extent additional Rockwell remedial activities are being conducted along Town Branch in the vicinity of the TVA substation.

Conclusions

The TVA Homer L Owens Substation Capacitors site is an approximate 1,475-square-foot parcel located north of Cornelius Avenue in Russellville, Logan County, Kentucky. Town Branch is located in the eastern portion of the TVA substation property.

The site was first discovered in the mid-1980s when contamination from the former Rockwell die-cast facility, located about 0.25 mile west of and upstream from the TVA substation property along Town Branch, was discovered in Town Branch.

The Rockwell die-cast facility is located on a 44-acre parcel of land on Highway 68 West in Russellville, Logan County, Kentucky. Rockwell operated an aluminum die-cast facility from 1957 until 1989. From 1957 to 1975, PCB-containing hydraulic fluid was used in the aluminum die-cast machines, and was the main source of PCBs at the die-cast facility.

Since the early 1980, numerous investigations have been conducted along Town Branch from the former Rockwell facility to the Mud River to address PCB contamination that originated from the former Rockwell facility. During the December site reconnaissance, evidence of remedial activities including rip rap was observed in Town Branch adjacent to the TVA substation property. These investigations were conducted under the purview of the Kentucky Department for Environmental Protection, and may be ongoing. Therefore, contamination in Town Branch at and downstream of the TVA substation is being addressed. Based on the review of historical documentation, analytical data, and pathway targets, the TVA substation presents a minimal threat to human health and the environment.

******CONFIDENTIAL******
******PRE-DECISIONAL DOCUMENT******
******SUMMARY HAZARD RANKING SYSTEM QUICKSCORE™ SCORE SHEETS**
******FOR COMPUTING PROJECTED HRS SCORE******

****Do Not Cite or Quote****

SCENARIO 1

Site Name:
TVA Homer L Owens Substation Capacitors

Region: 4

Evaluator: Sandra Harrigan

City, County, State:
Russellville, Logan County, Kentucky

Date: 6/19/2014

EPA ID#: KY8890090006

Lat/Long: 36.848450° north, 86.890857° west

	S Pathway	S ² Pathway
Ground Water Migration Pathway Score (S _{gw})	3.84	14.7456
Surface Water Migration Pathway Score (S _{sw})	42.60	1,814.76
Soil Exposure Pathway Score (S _s)	0.60	0.36
Air Migration Pathway Score (S _a)	1.61	2.5921
$S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		1,832.4577
$(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4$		458.114425
$\sqrt{(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4}$		21.40

Table 3-1 – Groundwater Migration Pathway Scoresheet			
Factor categories and factors		Maximum Value	Value Assigned
Aquifer Evaluated: Surficial			
Likelihood of Release to an Aquifer:			
1. Observed Release			
2. Potential to Release:	550		550
2a. Containment			
2b. Net Precipitation	10		
2c. Depth to Aquifer	10		
2d. Travel Time	5		
2e. Potential to Release [(lines 2a(2b + 2c + 2d)]	35		
3. Likelihood of Release (higher of lines 1 and 2e)	500		
	550		550
Waste Characteristics:			
4. Toxicity/Mobility	(a)	10,000	
5. Hazardous Waste Quantity	(a)	10	
6. Waste Characteristics	100		18
Targets:			
7. Nearest Well			
8. Population:	(b)	20	
8a. Level I Concentrations	(b)	0	
8b. Level II Concentrations	(b)	0	
8c. Potential Contamination	(b)	7	
8d. Population (lines 8a + 8b + 8c)	(b)	7	
9. Resources	5	5	
10. Wellhead Protection Area	20	0	
11. Targets (lines 7 + 8d + 9 + 10)	(b)		32
Groundwater Migration Score for an Aquifer:			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500] ^c	100		3.84
Groundwater Migration Pathway Score:			
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated) ^c	100		3.84

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c Do not round to nearest integer

Table 4-1 – Surface Water Overland/Flood Migration Component Scoresheet			
Factor categories and factors		Maximum Value	Value Assigned
Watershed Evaluated: Town Branch			
Drinking Water Threat			
Likelihood of Release:			
1. Observed Release	550	550	
2. Potential to Release by Overland Flow:			
2a. Containment	10		
2b. Runoff	10		
2c. Distance to Surface Water	5		
2d. Potential to Release by Overland Flow [(lines 2a)(2b + 2c)]	5		
3. Potential to Release by Flood:			
3a. Containment (Flood)	10		
3b. Flood Frequency	50		
3c. Potential to Release by Flood (lines 3a x 3b)	500		
4. Potential to Release (lines 2d + 3c, subject to a max of 500)	500		
5. Likelihood of Release (higher of lines 1 and 4)	550		550
Waste Characteristics:			
6. Toxicity/Persistence	(a)	10,000	
7. Hazardous Waste Quantity	(a)	10	
8. Waste Characteristics	100		18
Targets:			
9. Nearest Intake	50	0	
10. Population:			
10a. Level I Concentrations	(b)	0	
10b. Level II Concentrations	(b)	0	
10c. Potential Contamination	(b)	0	
10d. Population (lines 10a + 10b + 10c)	(b)	0	
11. Resources	5	5	
12. Targets (lines 9 + 10d + 11)	(b)		5
Drinking Water Threat Score:			
13. Drinking Water Threat Score [(lines 5x8x12)/82,500, subject to a max of 100]	100		0.60
Human Food Chain Threat			
Likelihood of Release:			
14. Likelihood of Release (same value as line 5)	550	550	
Waste Characteristics:			
15. Toxicity/Persistence/Bioaccumulation	(a)	500,000,000	
16. Hazardous Waste Quantity	(a)	10	
17. Waste Characteristics	1,000		180
Targets:			
18. Food Chain Individual	50	20	
19. Population			
19a. Level I Concentrations	(b)	0	
19b. Level II Concentrations	(b)	0	
19c. Potential Human Food Chain Contamination	(b)	0	
19d. Population (lines 19a + 19b + 19c)	(b)	0	
20. Targets (lines 18 +19d)	(b)		20

Table 4-1 – Surface Water Overland/Flood Migration Component Scoresheet			
Factor categories and factors		Maximum Value	Value Assigned
Human Food Chain Threat Score:			
21. Human Food Chain Threat Score [(lines 14x17x20)/82,500, subject to a max of 100]	100		24
Environmental Threat			
Likelihood of Release:			
22. Likelihood of Release (same value as line 5)	550	550	
Waste Characteristics:			
23. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	10,000	
24. Hazardous Waste Quantity	(a)	10	
25. Waste Characteristics	1000		180
Targets:			
26. Sensitive Environments	(b)		
26a. Level I Concentrations	(b)	0	
26b. Level II Concentrations	(b)	0	
26c. Potential Contamination	(b)	15	
26d. Sensitive Environments (lines 26a + 26b + 2c)	(b)	15	
27. Targets (value from line 26d)	(b)		15
Environmental Threat Score:			
28. Environmental Threat Score [(lines 22 x 25 x 27)/82,500, subject to a max of 60]	60		18
Surface Water Overland/Flood Migration Component Score for a Watershed:			
29. Watershed Score ^c (lines 13 + 21+ 28, subject to a max of 100)	100		42.60
Surface Water Overland/Flood Migration Component Score			
30. Component Score (S_{sw}) ^c (highest score from line 29 for all watersheds evaluated)	100		42.60

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c Do not round to nearest integer

Table 5-1 --Soil Exposure Pathway Scoresheet			
Factor categories and factors		Maximum Value	Value Assigned
Likelihood of Exposure:			
1. Likelihood of Exposure		550	550
Waste Characteristics:			
2. Toxicity	(a)	10,000	
3. Hazardous Waste Quantity	(a)	10	
4. Waste Characteristics		100	18
Targets:			
5. Resident Individual		50	0
6. Resident Population:			
6a. Level I Concentrations	(b)	0	
6b. Level II Concentrations	(b)	0	
6c. Population (lines 6a + 6b)	(b)	0	
7. Workers		15	
8. Resources		5	5
9. Terrestrial Sensitive Environments	(c)	0	
10. Targets (lines 5 + 6c + 7 + 8 + 9)	(b)		5
Resident Population Threat Score			
11. Resident Population Threat Score (lines 1 x 4 x 10)	(b)		49,500
Nearby Population Threat			
Likelihood of Exposure:			
12. Attractiveness/Accessibility		100	50
13. Area of Contamination		100	5
14. Likelihood of Exposure		500	5
Waste Characteristics:			
15. Toxicity	(a)	10,000	
16. Hazardous Waste Quantity	(a)	10	
17. Waste Characteristics		100	18
Targets:			
18. Nearby Individual		1	1
19. Population Within 1 Mile	(b)	4	
20. Targets (lines 18 + 19)	(b)		5
Nearby Population Threat Score			
21. Nearby Population Threat (lines 14 x 17 x 20)	(b)		450
Soil Exposure Pathway Score:			
22. Pathway Score ^d (S _s), [lines (11+21)/82,500, subject to max of 100]		100	0.60

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to a maximum of 60

^d Do not round to nearest integer

Table 6-1 --Air Migration Pathway Scoresheet			
Factor categories and factors		Maximum Value	Value Assigned
Likelihood of Release:			
1. Observed Release			
2. Potential to Release:		550	
2a. Gas Potential to Release		500	500
2b. Particulate Potential to Release		500	
2c. Potential to Release (higher of lines 2a and 2b)		500	500
3. Likelihood of Release (higher of lines 1 and 2c)		550	500*
Waste Characteristics:			
4. Toxicity/Mobility		(a)	200
5. Hazardous Waste Quantity		(a)	10
6. Waste Characteristics		100	6
Targets:			
7. Nearest Individual		50	20
8. Population:			
8a. Level I Concentrations		(b)	0
8b. Level II Concentrations		(b)	0
8c. Potential Contamination		(c)	19
8d. Population (lines 8a + 8b + 8c)		(b)	19
9. Resources		5	5
10. Sensitive Environments:			
10a. Actual Contamination		(c)	0
10b. Potential Contamination		(c)	0.2745
10c. Sensitive Environments (lines 10a + 10b)		(c)	0.2745
11. Targets (lines 7 + 8d + 9 + 10c)		(b)	44.2745
Air Migration Pathway Score:			
12. Pathway Score (S_a) $[(\text{lines } 3 \times 6 \times 11)/82,500]^d$		100	1.61

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to a maximum of 60.

^d Do not round to nearest integer

* Default value

